**IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK**

MARIBEL BAEZ; FELIPA CRUZ; R.D., ON BEHALF OF HER MINOR CHILD, A.S.; on their own behalf and on behalf of all others similarly situated; UPPER MANHATTAN TOGETHER, INC.; and SOUTH BRONX CHURCHES SPONSORING COMMITTEE, INC.,
 	
    Plaintiff,
 	
    v.
 	
NEW YORK HOUSING AUTHORITY,
 	
    Defendant.
	No. 13 Civ. 8916 (WHP)

DECLARATION OF NEIL STEINKAMP IN SUPPORT OF PLAINTIFFS' MOTION FOR AN ORDER APPROVING MODIFIED AMENDED STIPULATION AND ORDER OF SETTLEMENT

I, Neil Steinkamp, declare under penalty of perjury that the following is true and correct:

1.   I am a Managing Director at Stout Risius Ross, LLC ("Stout") and an expert on a range of strategic, corporate, and financial issues. I have extensive experience as a forensic data analyst. I have provided independent expert testimony in trials and in arbitrations involving complex commercial disputes and forensic investigations. I have also consulted on numerous matters involving low-income housing, tenants' rights, and other social justice issues. These include, but are not limited to, New York City's right to counsel initiative for low-income tenants, the New York City Human Resources Administration's Family Eviction Prevention Subsidy and the WeCARE Program. Moreover, I provide annual remarks at the Chief Judge of the State of New York's hearing on the economic impact of civil legal aid in New York, and am retained as a

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consultant to the New York Permanent Commission on Access to Justice. I have nearly twenty years of professional experience, hold a B.A. in Finance from Michigan State University, and am accredited as a Master Analyst in Financial Forensics and a Certified Valuation Analyst. See my curriculum vitae attached hereto as Exhibit 1. I respectfully submit this declaration in support of Plaintiffs' Motion for an Order Approving Modified Amended Stipulation and Order of Settlement (the "Revised Consent Decree").

Stout's Involvement in *Baez*

2.   Throughout the course of this declaration, "Stout" refers to myself and people working at Stout under my direction. Stout began assisting Plaintiffs, on a pro bono basis, on January 30, 2018, and has since devoted more than 500 pro bono hours to this matter. Stout has dedicated a significant amount of time and effort to understanding how NYCHA's Periodic Reports are generated, what data NYCHA has available, and how Plaintiffs can best collaborate with NYCHA to (i) improve the transparency, utility, and accuracy of NYCHA's Periodic Reports; (ii) develop meaningful metrics to measure NYCHA's compliance with the Revised Consent Decree; and (iii) redesign NYCHA's Periodic Reports to improve NYCHA's ability to use its own data to maximize its resources and improve its effectiveness and efficiency in remediating mold and excessive moisture.

3.   Stout's knowledge is derived from a thorough review of the documents listed in Figure 1 below. In addition, Stout participated in several hours of teleconference calls and numerous email exchanges with NYCHA employees responsible for NYCHA's data and analytics to understand and analyze how NYCHA generates, collects, analyzes, uses, and reports its data in the Periodic Reports.

Q	File	WO Report Month:	Data Up-to-Date as of:
Q1	Call Center Summary Table and Details	May '14 to July '14	9/29/14
	Mildew Summary Table and Details		
Q2	Call Center Summary Table	Aug '14 to Oct '14	12/30/14
	Mildew Summary Table and Details		
Q3	Call Center Summary Table and Details	Nov. '14 to Jan '15	3/30/15
	Mildew Summary Table and Details		3/30/15
Q4	Call Center Summary Table and Details	Feb '15 to Apr. '15	6/25/15
	Mildew Summary Table and Details		5/17/15
Q5	Call Center Summary Table and Details	May '15 to Jul. '15	8/10/15
	Mildew Summary Table and Details		8/4/15
Q6	Call Center Summary Table and Details	Aug. '15 to Oct. '15	11/9/15
	Mildew Summary Table and Details		11/1/15
Q7	Call Center Summary Table and Details	Nov. '15 to Jan '16	2/4/16
	Mildew Summary Table and Details (Parent)		2/11/16
Q8	Call Center Summary Table and Details	Feb '16 to Apr. '16	5/11/16
	Mildew Summary Table and Details (Parent)		5/9/16
Q9	Call Center Summary Table and Details	May '16 to Jul. '16	8/3/16
	Mildew Summary Table and Details (Parent)		7/31/16
Q10	Call Center Summary Table and Details	Aug. '16 to Oct. '16	11/4/16
	Mildew Summary Table and Details (Parent/Child)		11/6/16
Q11	Call Center Summary Table and Details	Nov. '16 to Jan '17	2/3/17
	Mildew Summary Table and Details (Parent/Child)		1/31/17
Q12	Call Center Summary Table and Details	Feb '17 to Apr. '17	5/2/17
	Mildew Summary Table and Details (Parent/Child)		5/1/17
	Mildew Updated Details (Parent/Child)		6/1/18
Q13	Call Center Summary Table and Details	May '17 to Jul. '17	8/8/17
	Mildew WO Summary Table and Details (Parent/Child)		8/10/17
Q14	Call Center Summary Table and Details	Aug. '17 to Oct. '17	11/3/17
	Mildew WO Summary Table and Details (Parent/Child)		11/13/17
Q15	Call Center Summary Table and Details	Nov. '17 to Jan. '18	2/12/18
	Mildew WO Summary Table and Details (Parent/Child)		2/13/18
Q16	Call Center Summary Table and Details	Feb. '17 to Apr. '18	5/8/18
	Mildew WO Summary Table and Details (Parent/Child)		5/7/18
Q12-15	Mildew WO Updated Details (Parent/Child) (and the SQL Code NYCHA used to generate the datasets)	Feb '17 to Jan. '18	2/27/18
	Mildew WO Comparison Summary Tables		5/9/18
Q13-16	Mildew WO Updated Details (Parent/Child) (and the SQL Code NYCHA used to generate the datasets)	May '17 to Apr. '18	5/30/18
N/A	NYCHA Quarterly Reports Data Glossary and Dimension	N/A	N/A
N/A	Stipulation and Order of Settlement		

Figure 1

Overview of Stout's Six Key Findings

      4.   Stout's review of NYCHA's processes and data revealed six key findings, each of which is further explained in the pages that follow:

      i.   NYCHA's Periodic Reports indicate that the mold reoccurrence rate across NYCHA developments has increased from 22% in Quarter 4 to 48% in Quarter 16, the most recent quarter. This rate may not capture the full extent of mold reoccurrence as it is based only on NYCHA's phone calls to tenants with completed repairs. NYCHA can and should develop an additional reoccurrence metric that relies upon its work order data, not just phone calls to tenants. NYCHA's work order data suggests that between Quarters 9 and 16, tenants in more than 32,000 of NYCHA's approximately 176,000 apartments have reported at least one occurrence of mold. Between Quarters 12 and 16, tenants in more than 115,000 apartments reported at least one occurrence of excessive moisture.

      ii.   The Periodic Reports have understated NYCHA's average times to complete simple (i.e., "seven-day") and complex (i.e., "fifteen-day") repairs for at least Quarters 12 through 16 because NYCHA calculated the averages based on the set of work orders opened and closed within the same quarter, and did not incorporate into its calculations the results of work orders that were opened in one quarter but closed in a subsequent quarter. When presented after the close of Quarter 15 with Stout's re-calculations of NYCHA's average times to complete repairs, which rectified the omission of these work orders from the reporting calculations, NYCHA admitted that

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the datasets presented in its Periodic Reports are a product of inaccurate and inconsistent data and processes. In addition, NYCHA has provided calculations in its Periodic Reports regarding its average days to complete repairs based on the times taken to complete only the *closed* work orders, instead of based on the times taken to complete both closed *and* open work orders as is required by the Original Consent Decree in Paragraphs 1(f) and 4. By failing to include open work orders in its calculation of completion times, NYCHA has further understated the average times taken to complete repairs.

iii. NYCHA's methodologies for determining which repairs should be classified as seven-day repairs and which should be deemed fifteen-day repairs are flawed and have changed over time. Rather than classify repairs as seven-day or fifteen-day based on the complexity of the work required, NYCHA has classified such repairs based on the *number* of child work orders opened for a repair and the *types of workers* assigned to them. NYCHA should use a different methodology to make its seven- and fifteen-day repair classifications more useful, and to make its time calculations more accurate.

iv. Flaws in NYCHA's exclusions of "No Work" work orders from its calculation of average completion times have caused additional inaccuracies in the Periodic Reports. From Stout's review, it became apparent that NYCHA has classified and excluded certain repairs on the basis of being "No Work Done" work orders even where the data indicates

that repairs were performed or necessary. Similarly, NYCHA has mistakenly excluded from its average completion times a number of work orders that NYCHA has labeled as "unfounded" even though other data indicates that these work orders should not have been deemed "unfounded" because mold existed and, in some instances, was also repaired by NYCHA.

v. There are a variety of other inconsistencies and flaws in NYCHA's data processing methodologies, including inconsistent determinations as to how many work orders are "closed" and, in turn, how many work orders should be excluded as "outliers."

vi. The length of time it takes NYCHA to complete a repair is often more significantly influenced by the scheduling and availability of the crafts associated with the repair rather than the complexity of the work required, such that NYCHA could decrease its average completion time for mold and excessive moisture work orders through improved scheduling practices.

5. NYCHA can and should implement improved methodologies and business practices to enable accurate measurement and reporting of the reoccurrence of mold and excessive moisture as well as the times taken to complete seven-day and fifteen-day work orders, to improve NYCHA's overall response time on repairs, and to ensure compliance with the Revised Consent Decree. Stout has recommended a number of improvements, further detailed below, and can assist NYCHA in implementing them.

Finding #1: NYCHA's Tenant-Reported Mold Reoccurrence Rate Has Trended Upward

6. Under Paragraph 6 of the Original Consent Decree, NYCHA is required, "within no more than 60 days after the completion of a Level II or III Work Order, [to] make a good-

faith attempt to contact the resident to determine if all of the work identified in the Work Order was completed, and the mold and excessive moisture problems and their underlying causes have been effectively addressed." The NYCHA Operations & Maintenance Policy for Mold & Moisture Control in Residential Buildings defines Level II work orders as those involving 10 to 100 square feet of mold, and Level III work orders as those involving more than 100 square feet of mold.

7.   NYCHA reports a combined reoccurrence rate of Level II and Level III mold repairs for each quarter based on tenants' responses to NYCHA's telephone calls (the "Tenant-Reported Reoccurrence Rate"). NYCHA determines this reoccurrence rate by dividing the number of calls in which tenants reported mold reoccurrences by the total number of successful phone contacts made with NYCHA tenants. Between Quarter 1 and Quarter 16, NYCHA's phone calls to tenants have indicated a quarterly Tenant-Reported Reoccurrence Rate of between 22% and 48%. *See* Exhibit 2 (NYCHA's Periodic Reports on Reoccurrence Rates for Quarters 1 through 16). The overall Tenant-Reported Reoccurrence Rate across all reported quarters is 32.3%. The trend line shown in red in Figure 2 below shows that the quarterly Tenant-Reported Reoccurrence Rate has generally trended upward, from a low of 22% in Quarter 4 to a high of 48% in Quarter 16.
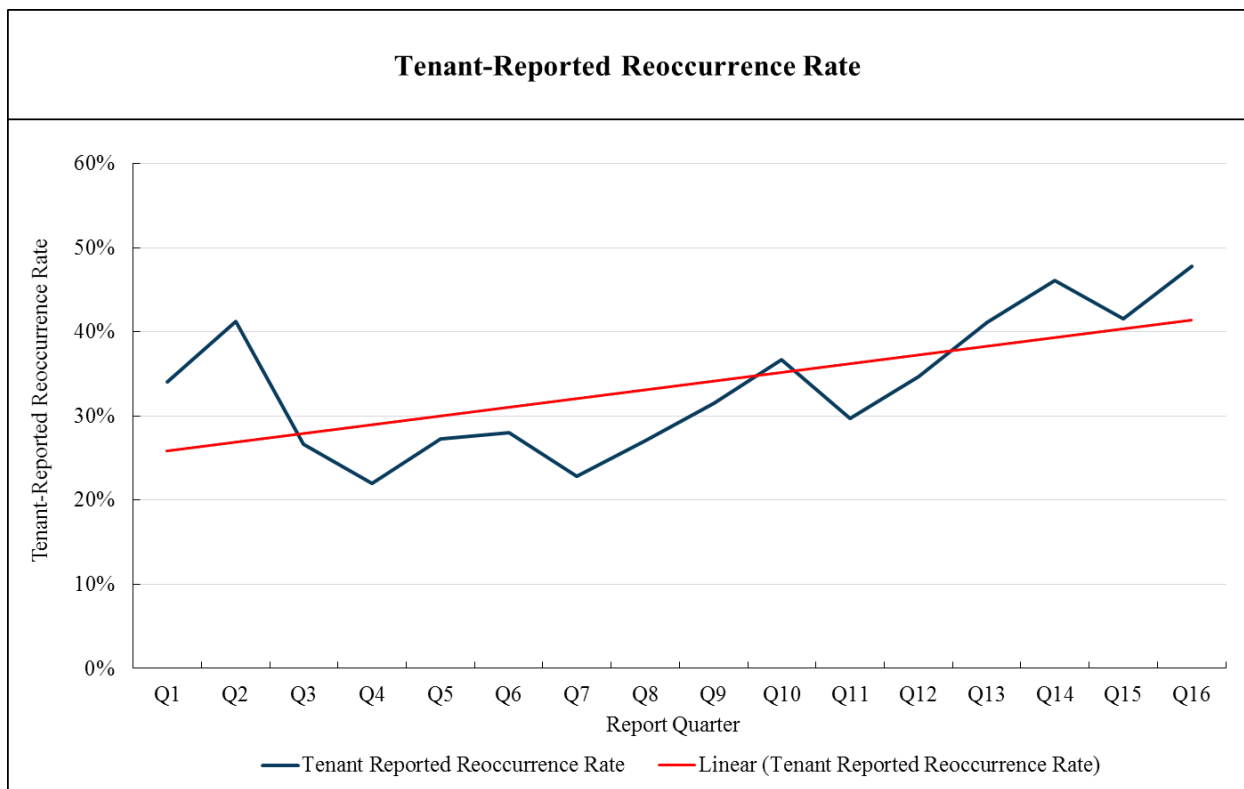
Tenant-Reported Reoccurrence Rate

Figure 2

8.   While the Tenant-Reported Reoccurrence Rate is a useful general measurement of mold reoccurrence, and while NYCHA's phone calls serve the valuable purpose of ensuring that NYCHA is given the opportunity to open new work orders when tenants respond that mold has reoccurred, the Tenant-Reported Reoccurrence Rate does not provide a complete assessment of NYCHA's compliance and does not provide additional information regarding challenges and opportunities for improvement.

9.   The Tenant-Reported Reoccurrence Rate, although it is the only measure of reoccurrence that NYCHA is required to report under the Original Consent Decree, is incomplete in that it is based only on a subset of Level II and III work orders where NYCHA made contact with the tenant, and it *excludes* all Level I mold work orders and all excessive moisture work orders. In calculating reoccurrence rates based only on reports of Level II and III mold

conditions, NYCHA does not allow Level I work orders to ever be counted as reoccurrences of mold which, in turn, means that Level II and III work orders (which in Quarter 16 comprised 35.4% and 1.3% of all closed work orders, respectively) are never counted as reoccurrences of past Level I work orders (which, in Quarter 16, comprised 20.6% of all closed work orders). Similarly, NYCHA has excluded all instances of excessive moisture work orders from its calculation of the Tenant-Reported Reoccurrence Rate, even though such excessive moisture conditions are closely related to mold growth.

10.   In addition, the Tenant-Reported Reoccurrence Rate omits instances in which mold reoccurs more than 60 days after the repairs were completed, and NYCHA does not report the amount of time taken between completing repairs and making its follow-up calls to tenants. Finally, NYCHA's reporting of reoccurrence rates aggregates reoccurrences across all buildings that NYCHA oversees, even though reoccurrence rates could easily be calculated for individual buildings, boroughs, operations groups, and developments. Absent such disaggregated reporting, the Periodic Reports are not useful in identifying and determining how to respond to unusually high or low reoccurrence rates in individual buildings and developments.

11.   For these reasons, Stout recommends that the Tenant-Reported Reoccurrence Rate be supplemented with an "Apartment History" measurement of reoccurrence, as described below at ¶ 48. An Apartment History measurement of reoccurrence would be based on mold and/or excessive moisture work orders tied to particular apartments. Between Quarters 9 and 16, more than 32,000 apartments had at least one mold work order. Between Quarters 12 and 16, more than 115,000 apartments had at least one excessive moisture work order.

Finding #2: NYCHA Has Understated Its Average Completion Times for Simple and Complex Repairs Due to Data Omissions and Miscalculations

12.   Due to a variety of errors and omissions, NYCHA's Periodic Reports have misreported NYCHA's average times to complete both simple and complex repairs for at least Quarters 12 through 16. As demonstrated by Stout's re-calculations below, NYCHA has completed the majority of simple and complex repairs on time but has understated its average completion times.

13.   Paragraph 5(a) of the Original Consent Decree requires that NYCHA report the average times to complete mold and excessive moisture work orders and the percentage of work orders completed within the seven- and fifteen-day service levels. As to NYCHA's average time to complete mold repairs, one reason NYCHA's calculations were inaccurate is that NYCHA was not updating its Periodic Reports to account for work orders that were closed after the quarter ended. That is, NYCHA was excluding from its calculations work orders that were opened in one quarter and closed in a subsequent quarter – meaning that the work orders that often took the longest time to complete were not included in NYCHA's calculation of average completion times.[1] As a result of these exclusions, the numbers NYCHA reported as its "Average Days to Complete" and "Percent Completed On Time" indicated compliance, even though many open work orders that were excluded had not been completed within the required timeframe.

14.   To confirm its understanding of NYCHA's calculations, and to identify further inconsistencies and issues that may lead to inaccurate reporting, Stout first replicated NYCHA's

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[1]   This problem also affects NYCHA's Periodic Reports concerning its average time to complete excessive moisture repairs. NYCHA did not begin reporting excessive moisture work order data until Quarter 12 and has not provided updated data that would enable Stout to re-calculate NYCHA's excessive moisture average completion times.

process for calculating the figures reported in its Periodic Reports for Quarters 12 through 16. Stout then applied NYCHA's calculation methodologies to updated datasets that NYCHA provided containing all work order data between Quarters 12 and 16, as available at the beginning of June 2018. These datasets included updated information about work orders that was unavailable at the time of NYCHA's original Periodic Reports for each of these quarters, such as information for work orders that were considered "open" at the end of a quarter and subsequently closed, as well as work orders that changed in classification from a simple (*i.e.*, seven day) work order to a complex (*i.e.*, fifteen day) work order.

15. By excluding work orders opened in one quarter and closed in a subsequent quarter, and by not providing regularly updated work order information for past quarters, NYCHA's calculations understated the average days taken to complete repairs while overstating the percentage of work orders that were completed on time. Figure 3 shows NYCHA's original reported figures for Quarters 12 to 16 and the figures that Stout recalculated by applying NYCHA's same methodology in use as of Quarter 16, but using the updated Excel spreadsheets that NYCHA provided in June 2018. The updated data illustrates that NYCHA is out of compliance with the fifteen-day requirement, and noncompliant with the seven-day requirement for Quarter 15.

Quarter	Category	NYCHA Original Reports		Stout's Recalculations With Updated Closed Work Order Data	
		% Closed on Time	Avg. Days to Complete	% Closed on Time	Avg. Days to Complete
Q12	7 Days	58.4%	5.0	70.0%	6.99
	15 Days	58.2%	11.2	49.0%	29.4
Q13	7 Days	77.0%	5.1	72.7%	6.6
	15 Days	67.5%	12.0	40.7%	35.5
Q14	7 Days	76.6%	5.1	73.0%	6.5
	15 Days	63.4%	13.6	42.3%	27.7
Q15	7 Days	68.6%	5.6	67.3%	7.3
	15 Days	57.5%	13.7	44.8%	22.5
Q16	7 Days	71.4%	5.4	67.4%	6.2
	15 Days	64.3%	12.2	55.0%	15.1

Figure 3

16.   As time passes and more work orders from Quarters 12 through 16 are closed, the figures for Average Days to Complete are likely to increase until all work orders from a given quarter are closed. The increase in Average Days to Complete is expected to be most significant for recent quarters because these quarters typically have the most incomplete work orders.

17.   When presented with Stout's re-calculations in March 2018, NYCHA agreed that its Periodic Reports had left significant gaps in capturing all closed work orders and agreed to work with Stout to generate revised reports for Quarters 12 through 15 and to develop new reports regarding performance requirements in the future. In its most recent Periodic Report, NYCHA has provided updated performance summary tables for Quarters 12 through 15 to address this issue, and has recently provided the Plaintiffs with data with which to check those calculations. NYCHA will need to continue to provide updated datasets and calculations for quarters with outdated work order details to fully redress this issue.

18.   The re-calculations presented in Figure 3 above adopt NYCHA's calculation methodology but correct for omissions in NYCHA's data. However, Stout has further found that NYCHA's calculation methodology itself is not consistent with the calculations called for in the

Original Consent Decree (Dkt. # 22). Under Paragraphs 1(f), 4, and 5(a) of the Original Consent Decree, NYCHA is required to maintain an average "service level" of seven days for 95 percent of work orders that require only "simple" repairs, and an average "service level" of fifteen days for 95 percent of work orders that require "complex" repairs. Both the Original Consent Decree and NYCHA's Periodic Reports use the term "service level" to refer to the calculation of how long it takes to perform repairs for the purpose of determining NYCHA's compliance with the seven- and fifteen-day requirements. The Original Consent Decree defines this calculation as "the sum of the total days for all closed *and open* work divided by the total work orders closed *and open* at the end of the reporting period" (emphasis added). Stout's analysis of NYCHA's work order data from Quarters 1 through 16 shows that, in each of NYCHA's Periodic Reports, NYCHA considered only *closed* work orders in its average "service level" calculation, which NYCHA reports as "Average Days to Close." In excluding *open* work orders from the calculations of its average time to perform repairs, NYCHA has erroneously excluded from its averages many of the repairs that took the longest time to complete.

Finding #3: NYCHA's Classification Methods for Simple and Complex Repairs Are Flawed And Have Changed Over Time

19.   Under Paragraphs 1(d), 1(e), 4, and 5(a) of the Original Consent Decree, NYCHA must complete repairs in under seven days if they "involve simple repairs that can be done by a maintenance worker in a single visit to the apartment" and must remediate mold conditions within fifteen days if they "involve relatively complex repairs that need skilled trades or other specialized staff to address and may require multiple visits to the apartment." This means that a work order should be classified (i) as a seven-day work order if it is *possible* for the condition to be addressed by a maintenance worker or some form of a general workmanship NYCHA staff member by performing repairs, each of which could individually be completed in a single

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apartment visit; or (ii) as a fifteen-day work order if it *requires* complex repairs by specialized staff or skilled trades.

20. **NYCHA's Classification Methods:** To understand how NYCHA determines which repairs should be classified as seven-day and which should be classified as fifteen-day in practice, Stout analyzed NYCHA's Periodic Reports and the code NYCHA uses to compile and classify the data contained within them. Stout determined, and confirmed with NYCHA, that NYCHA uses a method for classifying work orders based on information about how a work order *was* handled to make judgments about how it *should have been* handled. That is, rather than classify repairs as simple or complex from the outset based on the complexity of the work and the number of times an apartment *needs* to be visited, and by whom, NYCHA uses the work order history of *who visited* an apartment, and how many times the apartment *was visited* and then retroactively applies the simple or complex classification. Consequently, work orders are classified as fifteen-day repairs based partially on whether and how many times specialized staff visited the apartment, and not based on whether such specialized staff were necessary or whether they even performed complex repairs – or any repairs at all – at any visit to the apartment. NYCHA's current classification rules are as follows: a work order is a seven-day work order if the apartment was visited by NYCHA staff only once, or if NYCHA staff visited multiple times, but every visit after the first was handled by a Caretaker, Chief Caretaker, Supervisor of Caretakers, or a Lead Abatement Worker; all other work orders are classified as fifteen-day repairs, either because they involved multiple apartment visits, or because they involved the presence of a specialized staff member. It is questionable whether using a work order's history to determine its classification is necessary or appropriate.

21.   **Inconsistent Classification Methods:** In Quarter 7, in response to the Court's Order dated December 15, 2015, NYCHA began to connect work order "parents" – *i.e.*, the first work order in a series of work orders scheduled to remediate a mold/excessive moisture condition and the group identifier for the series of subsequent work orders – and "children" – *i.e.*, the individual work orders making up the series of work orders under each "parent." The result was more work orders reported with multiple apartment visits and, in turn, more work orders classified as fifteen-day work orders. At the same time, NYCHA changed the crafts it considered to be "skilled trades or specialized staff" for the purpose of work order classification. As shown in Figure 4 below, before Quarter 7, when a maintenance worker – one of the most common types of crafts to visit apartments for mold repairs – visited an apartment, the work order would be classified as a seven-day repair. Beginning in Quarter 7, NYCHA deemed maintenance workers to be "skilled trades or specialized staff," meaning that when maintenance workers visited an apartment, the work order would be classified as a complex fifteen-day repair – just as if, for example, a brick layer or carpenter had been assigned to the work order. Because the Original Consent Decree associates the work of a "maintenance worker" with simple repairs, work orders classified as fifteen-day repairs because they involve the work of maintenance workers may be misclassified in the Periodic Reports.

	Are Parent/Child WO's Linked?	What Defines a 7-Day Repair?	What Defines a 15-Day Repair?
Q3 Q4 Q5 Q6	**Not Linked** (All Work Orders are single visits)	Work Orders are handled by a: **Maintenance Worker**, Caretaker, Chief Caretaker, Lead Abatement Worker, or a Lead Investigator	Work Orders are handled by: Any other craft (e.g., Painter, Vendor, Plasterer, etc.)
Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16	**Linked** (Work Orders are single or multiple visits)	Work Orders are handled in: (a) A single visit, or (b) Multiple visits, where all visits after the first are all handled by a: Chief Caretaker, Caretaker, Supervisor of Housing Caretakers, or a Lead Abatement Worker	Work Orders are handled in: Multiple visits, where any single visit after the first is handled by: Any other craft (e.g., **Maintenance Worker**, Painter, Plasterer, Bricklayer, Carpenter, etc.)

Figure 4

22.   As the details of a family of work orders (*e.g.*, the number of apartment visits, crafts performing repairs at apartments, etc.) change over time, NYCHA's classifications for all work orders based on those details also change over time. For example, almost all work orders initially begin with one apartment visit, which means that nearly all work orders begin as seven-day repairs, until a new apartment visit leads it to be classified as a fifteen-day repair. In this way, in Quarter 12, NYCHA reclassified 25% of work orders as fifteen-day repairs after they already had been pending for at least seven days.

Finding #4: NYCHA's Methodologies for Excluding "No Work Done" and "Unfounded" Work Orders Contain Inconsistencies and Inaccuracies

23.   Stout's review of NYCHA's Periodic Reports identified a number of inaccuracies and inconsistencies in NYCHA's methodology for determining which work orders should be excluded from the calculation of its average time to complete repairs on the basis that the work

order did not require any repair work to be done (*i.e.*, "No Work Done" work orders) or that the mold or excessive moisture problem was "Unfounded."

24. **Inconsistent Determinations of Which Work Orders to Exclude as "No Work Done" Work Orders:** As detailed in Figure 5 below, NYCHA's determinations about which "No Work" work orders to exclude when calculating its average completion times has changed several times across its Periodic Reports.

	Which WO's Count as Having "No Work Done"?	**Which of these "No Work Done" WO's are Excluded?**
Q3	Work orders where the Last Child Disposition Sub-Code (referred to in the reports as the "Last LabTrans Transtype") is either:	**Unknown** (Q3-Q8 reports only included details for non-excluded work orders, so the data is not complete enough to be certain how many excluded "No Work Done" work orders were <u>closed or open</u>.)
Q4		
Q5		
Q6	**ResNotHome**, or **ResRefused**	
Q7	Work orders where the Last Child Disposition Sub-Code is either:	
Q8		
Q9	<u>ResNotHome</u>, <u>ResRefused</u>, or <u>**+Unfounded**</u>	**Open and Closed** "No Work Done" WO's that do not require Capital Repairs.
Q10	Work orders where the Last Child Disposition Sub-Code is either:	**Closed** (as determined by the Last Child Disposition Sub-Code) "No Work Done" WO's which do not require Capital Repairs.
Q11	<u>ResNotHome</u>, <u>ResRefused</u>, <u>Unfounded</u>, **+PrevCorrected**, **+CompleteOnArrival**, **+NoWorkDoneWithSeq**, **+ResCorrected**, **+CreatedInError**, **+Duplicate**, **+FailedSched**, **+MoveOut**, **+ResCancel**, or **+ReslvdThruTriage**	
Q12		
Q13	Last Child Disposition Sub-Code is:	**Closed** (as determined by the Parent Disposition Sub Code) "No Work Done" WO's which do not require Capital Repairs.
Q14	<u>ResNotHome</u>, <u>ResRefused</u>, <u>Unfounded</u>, <u>PrevCorrected</u>, <u>CompleteOnArrival</u>, <u>NoWorkDoneWithSeq</u>, <u>ResCorrected</u>, <u>CreatedInError</u>, <u>Duplicate</u>, <u>FailedSched</u>, <u>MoveOut</u>, <u>ResCancel</u>, <u>ReslvdThruTriage</u>, or **+Unknown**	
Q15		
Q16		

Figure 5

25.   It is important to understand that the sets of work orders eligible to be excluded for not having work performed on them, under the most recent methodologies, do not represent the total set of work orders for which repairs were *unnecessary* or *impossible*. In order to only exclude those work orders—for which repairs are unnecessary or impossible, instead of excluding work orders that were simply closed after NYCHA rightly or wrongly did not perform any work on them—NYCHA would need to implement a new set of processes and data rules that would accurately identify and record at the outset which work orders are in need of repairs and for which repairs are possible, and then exclude all other work orders, where repairs are either unnecessary or impossible.

26.   **"No Work Done" Exclusions Where NYCHA Performed Repairs:** While NYCHA must exclude from the calculation of its average completion times all work order families that were closed without any work having been performed, Stout's analysis of NYCHA's data revealed that NYCHA has incorrectly classified hundreds of work orders as "No Work Done" work orders and improperly excluded them from the average completion times reported in its Periodic Reports. The reason for this is that NYCHA wrongly applies the "No Work Done" classification based on whether a parent work order's last child has had work done, regardless of whether work had been done on the parent work order or any other linked child work order. In the example shown in Figure 6 below, NYCHA reported a repair performed for the first child work order (twenty-five square feet of mold removed), but excluded the entire family of work orders from the calculation of average completion time – even though the last child was closed more than 52 days after the parent had been opened – simply because NYCHA coded the last child work order in the family as "No Work Done."

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Parent	Child	Parent Start Date	Last Child End Date	Craft	Child Disposition	Last Child Disposition	Repairs Done List	Mold Area
55069254	55069254	Nov. 17	Jan. 9	MAINT	Remedy	NoWorkDone WithSeq	MoldMildew Removed	25
55069254	55225298	Nov. 17	Jan. 9	PAINTER	NoWorkDone WithSeq	NoWorkDone WithSeq	N/A	N/A

Figure 6

27.   Stout also found that NYCHA generally takes much longer to close work orders excluded as a result of the "No Work Done" classification. NYCHA's data shows that work orders classified as "No Work Done" work orders are closed on time less frequently than other work orders. Together with the common-sense notion that "No Work Done" work orders are unlikely to require multiple apartment visits, the tendency of "No Work Done" fifteen-day repairs to be closed much later than their non-excluded counterparts casts significant doubt on whether such work orders are properly classified as either a fifteen-day repair, a "No Work Done" work order, or both.

28.   **Work Orders Excluded As "Unfounded" Where Data Indicates Mold Was Reported And Repaired:** In addition to flaws in its methodology for excluding "No Work Done" work orders, NYCHA has incorrectly labeled certain work orders as "Unfounded" and excluded them from its calculation of Average Days to Complete. For example, in one instance, NYCHA excluded a work order family from its calculations because the parent's last child work order was marked "Unfounded," even though the data indicates that the parent work order was associated with 15 square feet of mold and it took NYCHA more than 18 days to clean the mold. The details from this parent work order are shown below in Figure 7.

Parent	Child	Child Disposition	Last Child Disposition	Repairs Done List	Mold Area
56269042	56269042	STATUS-CLOSE-REMEDY	…UNFOUNDED	AREACLEANED	15
56269042	56335023	STATUS-CLOSE-…- UNFOUNDED	…UNFOUNDED	N/A	15

Figure 7

29.   Work orders should not be excluded as "Unfounded" when any work order in the

family indicates a square footage of mold above zero. Determining a parent work order's

characteristics by its last child's characteristics leads to inaccuracies in NYCHA's reported

metrics.

**Finding #5: Additional Inconsistencies and Flaws in NYCHA's Data Processing
Methodologies**

30.   Stout has identified inconsistencies in the application of NYCHA's

methodologies for determining which set of work orders are considered *closed*, and which 5% of

the quarter's longest work orders should be excluded from the calculations as outliers.

31.   **Inconsistent Determinations Regarding the Number of "Closed" Work**

Orders: NYCHA's process for determining whether a work order qualifies as "closed" has not

remained consistent across its Periodic Reports. In some quarters, NYCHA deemed a parent

work order "closed" if the parent's last child work order was considered closed (indicated by the

"LASTCHILD_DISPOSITION_SUBCODE" field). However, as shown in Figure 8 below, in

other quarters, NYCHA used a field showing another disposition code (called the

"DISPOSITION_SUB_CODE") to determine whether the overall parent work order was

considered closed. While these two data columns are similar and related, using them

interchangeably to determine the final status of a work order can lead to inconsistent

classifications, as work orders can – and often are – listed as "open" in one column, and listed as "closed" in the other.

	Which Data Column Defines Work Orders as "Closed", "Open", etc.?
Q3	Parent "Status"
Q4	
Q5	
Q6	
Q7	Parent "Disposition Sub Code"
Q8	"Last Child Disposition Sub Code"
Q9	
Q10	
Q11	
Q12	
Q13	Parent "Disposition Sub Code"
Q14	
Q15	"Last Child Disposition Sub Code"
Q16	Parent "Disposition Sub Code"

Figure 8

32.   **Inconsistent Determinations for How Many "Outliers" To Exclude:** NYCHA has also been inconsistent in its methodologies for determining how many work orders to exclude as "outliers." Because the Original Consent Decree requires NYCHA to complete only 95% of work orders within seven or fifteen days, NYCHA can exclude 5% of work orders as "outliers," but NYCHA has used two different methods to identify the number of outlier work orders to exclude:

> i.   In Quarters 7, 8, 13, 14, 15 and 16, NYCHA determined how many outliers to exclude by multiplying 0.05 by the total number of all non-Capital, non-"No Work" work orders in the quarter (so, including closed, and open work orders).

ii.   In Quarters 9, 10, 11 and 12, NYCHA determined how many outliers to exclude by multiplying 0.05 by the total number of all non-Capital, non-"No Work" work orders that were *closed* in the quarter (so, not including open work orders).

33.   The difference between these two methods is that when NYCHA uses the first method, which leads to the exclusion of hundreds of more work orders than the second method, it is taking 5% *of a larger set* of work orders (5% of closed *and* open work orders) than it would using the second method (5% of only closed work orders). Although the Order directs NYCHA to incorporate the "Days to Complete" of open *and* closed work orders in its time calculations, NYCHA has only recorded and reported the "Days to Complete" of each of its *closed* work orders in the datasets it has provided. In turn, when NYCHA identifies the longest 5% of work orders, it only identifies *closed* work orders to exclude as outliers, even though work orders still open at the end of a quarter often remain open for much longer than the closed work orders NYCHA excludes as outliers.

34.   If NYCHA begins to calculate its service levels by measuring the "Days to Complete" of closed *and* open work orders, as directed in the Original Consent Decree, NYCHA's reports should exclude the oldest 5% of closed *and* open work orders (as NYCHA has done in 6 of the last 10 quarters). If NYCHA continues calculating the service levels by only measuring the days taken to complete *closed* work orders, it should only be excluding 5% of *closed* work orders (as NYCHA has done in Quarters 9 through 12). In sum, to ensure consistency and accuracy, the rules for identifying outliers should be as follows: NYCHA should report the days taken to complete *all* of its work orders (including closed, open, and canceled work orders) and exclude the oldest 5% of work orders that: (i) are open or closed (unless NYCHA continues to calculate

the average times to complete based only on *closed* work orders, in which case the 0.05 should be multiplied only by the number of work orders that are closed); (ii) are not already excluded as "No Work Done" work orders or Capital Repairs.

35.   It should be noted that, under either formula, this calculation does not result in the exclusion of a set of particularly anomalous repair times that truly are "outliers" in the statistical sense of the word. Rather, the method of identifying outliers that the Original Consent Decree permits merely shortens the effective "tail" of each quarter's distribution of repair times, serving only to reduce the overall average completion times by excluding the data's highest data points, which are statistically representative of the "included" work orders.

Finding #6: Scheduling of Trades for Mold and Moisture Repairs Is a More Significant Contributor to Delays in Completing Repairs Than Is the Complexity of the Work Required

36.   In an effort to determine how NYCHA could reduce its average completion times, Stout investigated the factors contributing to certain work orders remaining open for extended lengths of time. Because Stout's analysis was based on the quarterly report data NYCHA provided that, as described above, has significant shortcomings, Stout's analysis is also limited by those shortcomings. Nevertheless, the results suggest that NYCHA could greatly reduce both the occurrence of overly lengthy repairs, and the amount of time such repairs take, by improving its procedures for scheduling trades and engaging outside contractors to perform repairs.

37.   In reaching this conclusion, Stout reviewed the 10% of work orders that required the greatest amount of time to close, and compared their characteristics with those of the remaining 90% of work orders. Within each of these two sets of work orders, Stout focused on child work orders with a single trade and disposition, enabling us to identify causes of delay with greater specificity.

38.   We observed that the length of time it takes to close a child work order is often more significantly influenced by the trades associated with it, than by the complexity of the work required. For example, child work orders involving carpenters, vendors, plasterers, and electricians – all "off-site" trades (*i.e.*, trades that have to be scheduled to make a special visit to the apartment) – tended to take the longest amount of time to close. Child work orders involving painters, bricklayers, and roofers – also primarily "off-site" trades – took a medium amount of time to close.

39.   By contrast, child work orders associated with maintenance workers, caretakers, chief caretakers, and lead abatement workers – primarily "onsite" trades (*i.e.*, trades that are typically onsite at NYCHA developments as a matter of routine) – took the least amount of time to close.

40.   We also observed that child work orders taking the longest time to close frequently wait the longest time before an initial apartment visit takes place. That is, the delay occurs between the receipt of the tenant's complaint and the time when the first NYCHA trades person visits the apartment to make a repair. Again, this type of delay – *i.e.*, waiting for the first child work order appointment to occur – is unrelated to the complexity of the work involved in performing the repair itself.

41.   Altogether, this led Stout to the preliminary conclusion that scheduling inefficiencies, and potentially issues of staff and resource availability, are a primary cause of work orders remaining open for an excessive length of time, and that this factor is of greater impact than the actual complexity of the work or the time it takes to perform the work necessary to complete the repair.

42.   This preliminary conclusion further suggests that NYCHA could greatly improve

its overall response time for mold and excessive moisture repairs by improving its scheduling

and contracting practices. Additional analysis, based on improved data from NYCHA, could

provide further insight into how to streamline the scheduling and contracting processes and what

types of additional resources would be most beneficial.

Redesigning and Auditing NYCHA's Periodic Reports through Forensic Data Analysis Will Ensure Accuracy, Increase Utility, and Provide Meaningful Measurements of NYCHA's Compliance with the Order

43.   The Revised Consent Decree dated April 6, 2018 calls for the appointment of an

Independent Data Analyst experienced in forensic data analysis who will redesign NYCHA's

Periodic Reports and monitor and improve the accuracy of those reports as needed thereafter.

The purpose of the Independent Data Analyst is to help NYCHA and the Plaintiffs in developing

meaningful and reliable reports that will not only measure NYCHA's compliance with its

obligations to remediate mold and excessive moisture, but will also assist NYCHA in using its

data to determine how to allocate its resources in the most efficient manner, where improvements

to the design or implementation of its mold and moisture remediation protocols may be

necessary, and ultimately, to improve the living conditions of NYCHA's tenants.

44.   Conducting a robust analysis and ongoing assessment of NYCHA's mold and

excessive moisture remediation processes and associated data will require the use of forensic

data analysis. This analysis combines quantitative and qualitative insights to identify and

communicate hidden patterns and relationships within data generated through complex business

processes. This approach emphasizes an understanding of the processes and activities that

generate data in order to resolve complex issues and investigate instances where mistakes could

be fixed or improvements could be made to remediate mold and excessive moisture more

effectively. While a forensic data analyst can use statistics as a method of measurement, a forensic data analyst, unlike a statistician, does not examine data without context. Rather, a forensic data analyst works to understand the processes and documents related to the data, evaluates the appropriate forms of measurement and assessment, and recommends the corresponding process-based adjustments. At each step of NYCHA's processes – involving tenants, contractors, and NYCHA employees, among others – there are opportunities to collect and interpret data to assist in understanding how NYCHA conducts repairs related to mold and excessive moisture and in identifying related challenges and opportunities. In short, expertise with forensic data analysis is critical not just in analyzing the data, but also in shaping NYCHA's mold and excessive moisture-related processes and reporting practices to ensure that mold and excessive moisture is remediated most effectively, for the health and living conditions NYCHA tenants, and to ensure that NYCHA remains in compliance with the Original and/or Revised Consent Decree.

45.   It is clear that NYCHA must adopt and implement rigorous new methodologies and processes to ensure accuracy in its measurement and reporting of mold and excessive moisture reoccurrence and the times taken to complete seven- and fifteen-day repairs. Based on Stout's findings to date, I have several recommendations for improving NYCHA's existing Periodic Reports and designing new Periodic Reports that can be further developed through the continued collaboration with NYCHA that is contemplated by the Revised Consent Decree. In short, by providing additional data points and disaggregating the data, NYCHA's Periodic Reports could empower the parties and the Court to better measure NYCHA's compliance with the Revised Consent Decree and to isolate areas where NYCHA needs to improve its performance in reducing the reoccurrence of mold and excessive moisture. Among other things,

I recommend that NYCHA create new Periodic Reports containing two reoccurrence rates – a Resident-Reported Reoccurrence Rate and an Apartment History Reoccurrence Rate – as well as an overall Compliance Rate.

46. **Regularly/Automatically Updating Past Periodic Reports With New Data:** Because NYCHA's Periodic Reports understate the times taken to complete work orders that are still unfinished at the end of a quarter, NYCHA should provide quarterly updates to all Periodic Reports for which, during the quarter, there were any work orders closed or still open. By doing so, NYCHA would no longer omit information for work orders that are unfinished at the end of the quarter in which they began and, in turn, would report more accurate figures of its compliance with the Original Consent Decree. Further, consistent with the Original Consent Decree, NYCHA should incorporate the "Days to Complete" of open work orders into its compliance calculations and should continuously update these work orders on a quarterly basis until all work orders from a given quarter are closed.

47. **Expanding The Tenant-Reported Reoccurrence Rate:** At present, NYCHA's Tenant-Reported Reoccurrence Rate is calculated based only on calls to tenants within sixty days after the completion of Level II and III work orders. This methodology may understate NYCHA's reoccurrence rates because it does not include excessive moisture work orders or Level I mold work orders and it permits NYCHA to contact tenants immediately after completing a repair, when it would be too soon for a mold reoccurrence to have materialized. The Tenant-Reported Reoccurrence Rate should be calculated based on calls to tenants strictly between sixty to one-hundred-twenty days after the completion of Level I, II, and III mold and excessive moisture work orders. In this way, the Tenant-Reported Reoccurrence Rate would not only capture data from a broader set of work orders, but would also require that NYCHA wait

longer than sixty days before contacting residents, giving mold a greater opportunity to reoccur. This would empower the parties and the Court to better determine whether NYCHA has been effectively remedying mold and excessive moisture conditions.

48. **Apartment-History Reoccurrence Rate:** Unlike the Tenant-Reported Reoccurrence Rate, which is calculated solely based on telephone calls to residents, the Apartment History Reoccurrence Rate would be calculated based on the number of times that a parent work order for mold or excessive moisture closed within the quarter is followed by a new parent work order for mold or excessive moisture in the same room of the same apartment as the prior parent work order within one year of the closing of the prior parent work order (a "Reoccurrence Work Order"), divided by the total number of parent work orders closed within the quarter. Until all work orders for mold or excessive moisture in a given quarter have been closed for longer than one year, NYCHA would update and report the Apartment History Reoccurrence Rate for each relevant quarter when providing a new Periodic Report. The Apartment History Reoccurrence Rate relies solely on work order data to assess whether NYCHA's repairs were effective in preventing mold or excessive moisture from reoccurring and takes a longer-term (one year) view of reoccurrence. This would provide a more accurate assessment as to whether work has in fact been properly completed such that mold or excessive moisture has not reoccurred. The Apartment History Reoccurrence Rate could be reported not only on a NYCHA-wide basis, but also in a disaggregated manner that shows individualized reoccurrence rates by development and by the "Level" or complexity of the repair. This would enable the parties and the Court to identify patterns and to pinpoint buildings, floors, and individual apartments where NYCHA has been successful or where additional training, resources, or modified remediation protocols should be developed and targeted.

49.   **Overall Compliance Rate:** NYCHA's overall compliance with the Original Consent Decree or Revised Consent Decree should be determined using a metric that measures both NYCHA's reoccurrence rates as well as its repair completion times. At this time, no such comprehensive data point is calculated or reported by NYCHA. This comprehensive compliance rate would provide a more accurate view of NYCHA's overall compliance with the Original Consent Decree. NYCHA's calculation of an Overall Compliance Rate would entail:

    i.   Reporting the percentage of closed and open work orders (excluding capital repairs, "Unfounded" work orders, and "No Work Done" work orders) that were completed within the required service levels;

    ii.   The percentage of those same closed and open work orders that led to a reoccurrence of another mold or excessive moisture condition;

    iii.   The percentage of those same closed and open work orders that were completed within the required service levels and that did not lead to a reoccurrence of a mold or excessive moisture condition; and

    iv.   The percentage of those same closed and open work orders that were not completed within the required service levels and that did lead to a reoccurrence of a mold or excessive moisture condition.

50.   **Avoiding Retroactive Classifications:** In general, the methodologies used to classify repairs for reporting purposes (*e.g.*, classifying work orders as seven- or fifteen-day work orders, or classifying and excluding work orders where no repairs are done) should be based on an assessment of the *complexity* of the work required, rather than on the actual work performed. Although a complex repair may require specialized work or multiple apartment visits, the absence of these characteristics does not necessarily render a work order a simple

repair; rather, it could be a complex repair that was handled less rigorously than it should have been. Similarly, a repair should not necessarily be deemed "complex" merely because NYCHA handled the mold condition in multiple apartment visits, or by staff capable of specialized repairs, if it is possible that the mold condition did not actually *require* multiple visits or any specialized repairs. As they exist currently, NYCHA's work order classifications methodologies do not always communicate the kind of information that they are intended to convey.

51.   **Disaggregated Calculations:** By reporting "disaggregated" calculations – such as reoccurrence rates and average times to close for each individual NYCHA development, building, borough, or employee – NYCHA would enable the parties and the Court to more effectively identify where NYCHA has been successful and where it needs to improve. This data would also provide valuable insight about how to make such improvements. Similarly, a requirement that NYCHA report not only averages and percentages for time compliance figures (*e.g.*, the average number of days to address simple and complex repairs), but also the quintile values for each statistic (*e.g.*, the minimum, maximum, and 20th, 40th, 60th, 80th, and 95th percentile values for length of time taken to address simple and complex repairs), would permit the parties and the Court to understand the full distribution of times taken to complete repairs, and whether any reporting averages are being affected by improper exclusions.

52.   **Outliers:** While the exclusion of five percent of work orders on the assumption that these work orders represent "outliers" is questionable for the reasons explained above, if NYCHA continues to use outlier exclusions, it should determine the five percent outliers as described above at ¶¶ 32-35. In addition, NYCHA should continuously and systematically examine all work orders taking the longest time to close and investigate why these work orders took an unusually long time to complete. Over the past five quarters, thousands of repairs have

taken longer than fifteen days to complete, and in some cases repairs have taken more than a year. Careful review of these lengthier repairs will inform NYCHA's understanding of the challenges that lead to work orders being closed after fifteen days, and its development of best practices and evidence-based strategies to address such challenges and to permanently improve its remediation techniques. Further, targeted data investigation, review, and visualization would enable NYCHA to find similarities in especially long work orders, to find relationships and uncover – and ultimately eliminate – patterns in how certain kinds of work orders take particularly long to complete.

53. **Third-Party Verification of Periodic Report Accuracy/Consistency:** Because NYCHA has commonly issued Periodic Reports with inconsistent, incorrect, or flawed methodologies, these reports should be checked for accuracy and consistency by an Independent Data Analyst with experience in forensic data analysis at the release of each new Periodic Report. Plaintiffs are not able to identify the inaccuracies in NYCHA's Periodic Reports without the assistance of an Independent Data Analyst, which is why the Revised Consent Decree calls for the appointment of an Independent Data Analyst going forward. Revised Consent Decree ¶¶ 17-18.
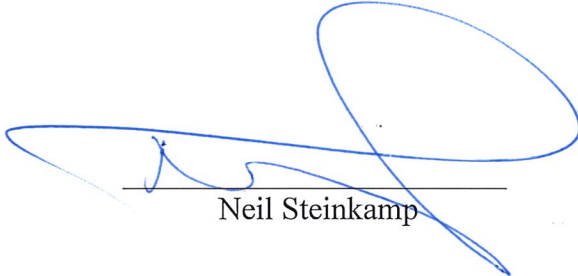
54. **Data Tracking/Reporting System Designed To Enable Business Process Improvements At NYCHA:** The entire mold and excessive moisture reporting process at NYCHA should be thoroughly documented and presented using data visualization techniques that enable NYCHA and other stakeholders to assess the effectiveness of NYCHA's mold and excessive moisture remediation practices, and to develop actionable insights that NYCHA can use to improve its effectiveness. In addition to assessing NYCHA's compliance with the Original Consent Decree, a primary purpose of NYCHA's reporting and the analysis that

accompanies it should be to equip NYCHA with the information it needs to develop specific actionable steps that address issues within its remediation practices. By using data not only to report compliance, but as a primary method of understanding patterns in mold and excessive moisture remediation, NYCHA and other stakeholders can identify where and why its practices are succeeding or failing, and devise new strategies to address barriers to improvement and to expand its most successful remediation practices. As NYCHA implements changes to improve its remediation processes, data analysis and visualization will enable it to understand which process changes have been successful, and identify the reasons other changes have failed to achieve their goals. Ultimately, more in-depth review and improvement of work order data and the use of data visualization tools with the guidance of an Independent Data Analyst will help NYCHA achieve the most important goal, which it shares with Plaintiffs: to reduce and eliminate the occurrences and reoccurrences of mold and excessive moisture conditions for all NYCHA residents.

55.   I reserve the right to amend and supplement the testimony set forth herein as necessary, or based on the receipt of additional or new information.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information, and belief.

New York, New York
August 31, 2018

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Neil Steinkamp